DOCUMENT RESUME

ED 398 442 CE 072 338

AUTHOR Lee, Lung-Sheng Steven
TITLE Technology Education in Taiwan: A Transition from Industrial Arts to Living Technology.
PUB DATE 10 Sep 96
NOTE 14p.; Paper presented at the Department of Technology Education, Aichi University of Education (Aichi, Japan, September 10, 1996).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Curriculum; *Educational Change; *Educational Objectives; *Educational Practices; *Educational Trends; Foreign Countries; *Industrial Arts; Secondary Education; *Technology Education
IDENTIFIERS *Taiwan

ABSTRACT

Secondary-level technology education in Taiwan is shifting its emphasis from industrial arts to living technology in an effort to overcome the following problems: industrial arts is seen as a subordinate subject; the public's perceptions are not aligned with the field; and industrial technology teachers have had to struggle with huge class sizes and limited teaching resources. To emphasize the study of technology as a way of equipping youth with the living skills needed in a technological'y advanced society, the subject industrial arts will henceforth be called living technology. To reflect the value of gender equity in education, students of both sexes will be required to take living technology. In an effort to bring more order to the complicated content of industrial arts, the content of living technology will be systematized into the following four domains at both the junior and senior high school levels: technology and life; information and communication; construction and manufacturing; and energy and transportation. Students will receive approximately 108 hours of living technology instruction during their 3 years in junior high school and approximately 72 hours during their 2 years in grades 10 and 11. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 398 442

Running head: TECHNOLOGY EDUCATION IN TAIWAN

Technology Education in Taiwan: A Transition from Industrial Arts to Living Technology

Lung-Sheng Steven Lee
National Taiwan Normal University

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Paper presented at
Department of Technology Education,
Aichi University of Education,
Kariya City, Aichi, Japan,
September 10,1996

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

L-S Lee

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)"

CE072 334

BEST COPY AVAILABLE

Abstract

Technology education in Taiwan, R.O.C. is shifting from industrial arts (IA) to living technology (LT). This paper describes the status quo and the transition of secondary-school technology education, covering IA and LT. The present IA programs prescribed in the curriculum standards have met the following three main challenges: (1) Industrial arts is seen as a subordinate subject. (2) The public's perceptions are not aligned with the field. (3) Teachers struggle with huge class sizes and limited teaching resources. The transition from IA to LT is at least based on the following rationale: (1) In order to emphasize the study of technology to equip youth with living skills needed in a technological society, IA will change in name to LT. (2) In order to reflect the value of gender-equity education, all male and female students will be required to take LT. (3) In order to organize the complicated content domain of IA, the content domain of LT is more systematic.

Technology Education in Taiwan:
A Transition from Industrial Arts to Living Technology

The Republic of China on Taiwan (henceforth, called Taiwan), having sovereignty over Taiwan proper, Kinmen, Matsu, the Pescadore Islands, and dozens of other small islands, is surrounded by Japan to the north, the Philippines to the south, mainland China to the west, and the Pacific Ocean to the east. The shape of Taiwan proper is like that of a fish (see Figure 1). Keelung and Kaohsiung, two international harbors, are, respectively, like the "mouth" and the "anus" of the fish. Taipei, the capital of Taiwan and 2,121 km from Tokyo, is seen as the "brain" zone of the fish. The tableland between Taoyuan and Hsinchu, and the Pingtung area are, respectively, the "belly fin" area and the "tail fin" area of the fish, so these two areas are windy. The Chianan Plain seems to be the fertile "abdomen" of the fish, so many rice and other crops are grown in this western lowland.

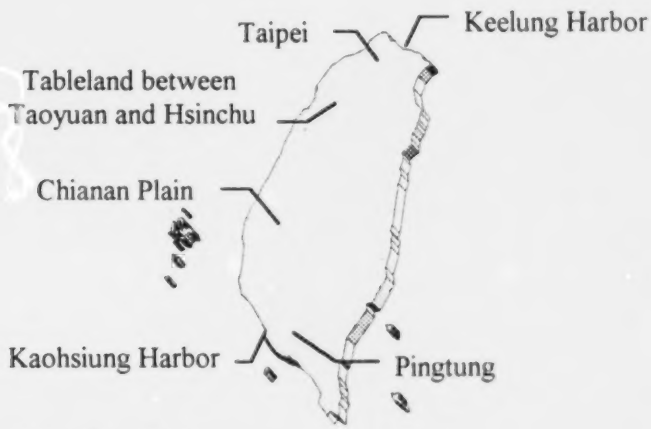

Figure 1. Taiwan, formerly called Formosa.

As recognized by DuPont Taiwan Ltd., through hard work and a willingness to learn, the people of Taiwan have achieved spectacular economic growth over the last few decades. Families in Taiwan truly can enjoy unparalleled prosperity in a free and stable environment (DuPont, 1996).Today's Taiwan is an industrialized society with a democratic political system. On this island, the area of which is around one-thirteen that of Japan, importance has always been attached to education by both the government and the people.

The current school system in Taiwan is based upon the so-called the 6-3-3-4 system: six years at elementary school, three years in junior high school, three years in senior high school or senior vocational school[1], and typically four years in college or university (see Figure 2). Entrance examinations are required for admission to schools beyond the nine years of compulsory education. The entrance examinations for admission to some prestigious senior high schools and colleges/universities admissions

are very competitive. In the school year of 1994[2], 21% of about 380,000 junior high school graduates were admitted to senior high schools, 45% to senior vocational schools, 9% to five-year junior colleges, and 12% to complimentary programs in senior vocational schools, with a remaining portion of 13%. In the same year, 57% of senior high school graduates and 16% of senior vocational school graduates were admitted to a variety of higher education institutions. Due to the high competition for admission to prestigious senior high schools and colleges/universities, it is common practice for secondary school students everywhere on the island to spend a large part of their free time in cram schools, and their parents spend a large part of their money there, too.

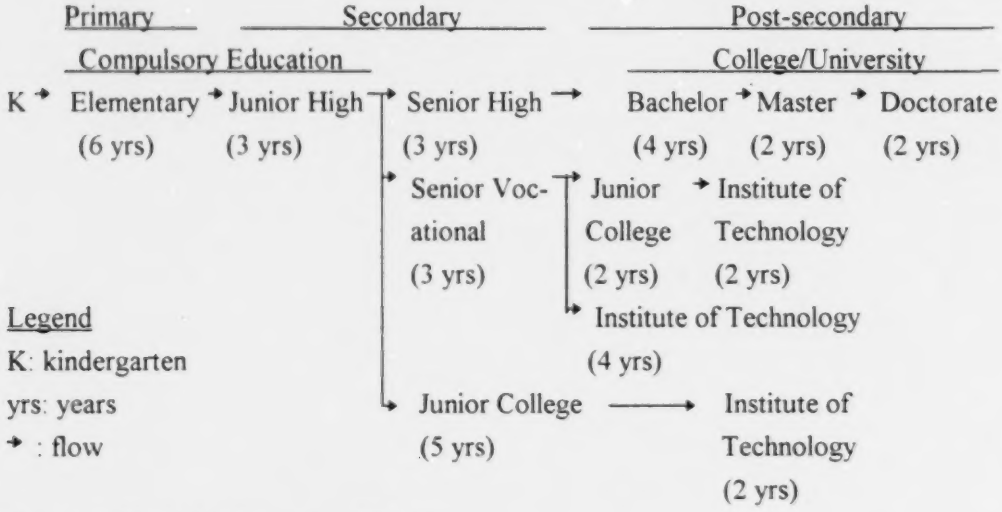

Figure 2. The school system of Taiwan.

In Taiwan, curriculum standards for each school level are determined and promulgated by the Ministry of Education (MOE), and each school's curriculum is planned and the authorized textbooks are edited on the basis of the curriculum standard. However, as a result of the keen competition existing in local senior-high-school entrance examinations and the nationwide University and College Joint Entrance Examination (CJEE) , it seems that the curriculum standard establishes the minimum standard of students' academic achievement, and the entrance examination represents the highest standard. The curriculum standard is commonly revised approximately every 10 years. Present elementary-school, junior-high-school and senior-high-school curriculum standards have been, respectively, implemented since the 1978, 1984, and 1984 school years, and their newly-revised curriculum standards will respectively take effect in the 1996, 1997 and 1998 school years. Technology education (科技教育, pronounced *ke-jih-jiau-yuh* in Chinese) is prescribed in these curriculum standards. This paper mainly describes the status quo and the transition of the technology education curriculum at the secondary school level in Taiwan. The main subject of

technology education at the secondary school level is called industrial arts （工藝, pronounced *gong-yih* in Chinese ） in the present curriculum standards and will be called living technology（生活科技, pronounced *sheng-hwo-ke-jih* in Chinese ） in the new curriculum standards. Thus, technology education in this paper is seen as a general term covering industrial arts and living technology.

Technology Education Has Been Swimming Up Stream

According to the present and new elementary, junior-high-school, and senior-high-school curriculum standards, the main subjects of technology education can be summarized as shown in Table 1. Because only a few educators, especially teacher educators in craft work teacher training departments/programs, are calling for elementary-school technology education, few technology education components are incorporated into craft work, which has been a broad-study subject. Hopefully, the number of technology teacher educators in craft work teacher training departments/programs will gradually increase. They could make a difference.

As shown in Table 1, currently, male secondary-school students (7-12 graders) in grades 7-11 are required to take two classroom hours of industrial arts weekly. However, implementation of any curriculum standards requires a balance in the supply of and demand for qualified teachers, appropriate facilities and equipment and adequate instructional materials (see Figure 2).

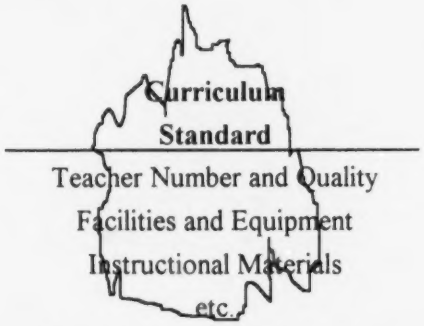

Figure 2. The iceberg metaphor of the curriculum standard itself and its contextual factors.

Table 1.

A Brief Summary of Technology Education Programs Prescribed in the Present and New Curriculum Standards.

Level	Course Title and Synopsis	
	Present Curriculum Standard	New Curriculum Standard
Elementary (Grades 1-6)	Craft Work （美勞） -Required for all students. -2 hrs/wk for grades 1 and 2, and 3 hrs/wk for grades 3-6. -Consisting of three domains; in the domain of Presentation and Practice[3], painting, sculpture, design, industrial arts, horticulture and home making are incorporated.	Craft Work （美勞） -Required for all students. -2 hrs/wk for grades 1 and 2, and 3 hrs/wk for grades 3-6. -Consisting of three domains; in the domain of Life Practice[4], living technology is emphasized as well as applied arts.
Junior High (Grades 7 -9)	Industrial Arts[5] （工藝） -All students are required to select "Industrial Arts" (IA) or "Home Economics" (HE), but schools commonly assign boys to IA programs. -IA consists of 2 hrs/wk or about 216 hrs in 3 years (i.e., grades 7-9). -IA consists of 13 domains.	Living Technology （生活科技） -All students are required to take "Home Economics & Living Technology" (HE&LT), 2 hrs/wk. -LT in HE&LT consists of 1 hr/wk or about 108 hrs in 3 years. -LT includes 4 domains.
Senior High (Grades 10 -12)	Industrial Arts[6] （工藝） -All students in grades 10 and 11 are required to take IA or HE, but schools commonly assign boys to IA programs. -2 hrs/wk or about 144 hrs in 2 years (i.e., grades 10 and 11). -IA consists of 5 domains.	Living Technology[7] （生活科技） -All students in grades 10 and 11 are required to take HE&LT, 2 hrs/wk. -LT in HE&LT consists of 1 hr/wk or about 72 hrs in 2 years. -LT includes 4 domains, the same as those in junior-high-school LT.

Regarding the number and quality of teacher, the balance between the demand for and the supply of industrial arts teachers has been observed and controlled by educational authorities because secondary-school teachers in Taiwan have mainly produced by normal universities. There have been two departments of industrial technology education (formerly called the departments of industrial arts education) located respectively at National Taiwan Normal University (NTNU) and National Kaohsiung Normal University (NKNU). These two departments have primarily aimed to train secondary-school pre-service and in-service industrial arts teachers and currently offer undergraduate and master's degree programs. In order to become qualified industrial arts teachers, undergraduate students in the two departments, who mainly graduate from senior high schools and pass the CJEE, have to satisfactorily complete a four-year on-campus course of study and a one-year secondary-school-based internship. During their four years on campus, students receive a tuition-waiver and partial living expenses.

The pre-service teacher preparation curriculum has three principal components: general/liberal coursework, technical/specialty coursework, and pedagogical/professional coursework. Although a minimum of 20 credits of designated technical coursework and a minimum of 20 credits of specified pedagogical coursework are mandated in the current secondary-school teacher certification requirements, teacher preparation programs commonly offer their students more than the minimal requirements. For instance, the minimum credit number for graduation for undergraduate students in the Department of Industrial Technology Education at NTNU is 148--28 credits in required general coureswork, 63 credits in required technical coursework, 26 credits in required pedagogical coursework, and 31 elective credits from the above three components.

The teacher preparation system in Taiwan is changing. Under the "Teacher Preparation Law," revised in 1994, all public and private universities and colleges which have approved colleges, departments, graduate institutes and/or programs specializing in education may participate in teacher training. After taking a close-up at this "open-door policy," many teacher educators began to be concerned about whether the quality of future industrial arts/living technology teachers could be assured. Also influenced by this policy, the two departments of industrial technology education at the two normal universities--NTNU and NKNU--began to expand their offerings. For example, the department at NTNU began to offer human resource development (HRD) programs to prepare professionals for industries.

In order to help in-service industrial arts teachers to continue to develop their competencies, educational authorities offer many in-service professional training and development opportunities such as short-term workshops and master's-degree-track or

non-degree-track graduate study. Many of these opportunities are provided free of charge. Incentives to encourage industrial arts teachers to participate in ongoing professional training and development are usually salary-based. Since school teachers' certificates are good for life and there is no teacher ladder to push them to participate in in-service training, it is a criticism that educational authorities only provide in-service teachers with a "carrot" but no "stick."

With respect to industrial arts facilities and equipment, in order to establish the minimum facility and equipment requirements for school subjects, secondary-school equipment standards are normally promulgated by the MOE after each curriculum standard revision. However, it is found that almost none of the secondary schools meets the requirements prescribed in the present industrial arts equipment standards. Some schools even have no industrial arts laboratory.

Regarding instructional materials, the present industrial arts textbooks are compiled and printed by commercial publishers but these textbooks must be approved by the MOE before distribution. Coupled with approved textbooks are handouts developed by school teachers.

In addition to the above contextual factors in the implementation of curriculum standards, the following four routine events can also be considered as support: (1) The Chinese Industrial Arts Education Association (CIAEA), now located in the Department of Industrial Technology Education at NTNU, devotes its energies to improvement of industrial arts education at all levels through recognition of outstanding industrial arts educators, annual conferences, publications, etc. (2) Funded by educational authorities and edited by the Department of Industrial Technology Education at NTNU, the "Journal of Industrial Arts Education" is disseminated monthly, free of charge, to secondary-school industrial arts teachers. (3) The yearly randomly selective students' industrial arts contest is held at province or special municipality levels. (4) An industrial arts consultative team, composed of industrial arts teachers, supervisors, and principals, is organized in every county and city to serve junior-high-school industrial arts teachers.

Although industrial arts has the above support, technology education still must swim upstream because it faces the following three main challenges:

1. Industrial arts is seen as a subordinate subject.

Secondary-school industrial arts is not included among the required subjects for advanced entrance examinations. This leads most people to see industrial arts as a subordinate, unworthy subject, and causes industrial arts programs to lack desirable expectations and effective support.

2. The public's perceptions are not aligned with the field.

Industrial arts has commonly been perceived as the equivalent of handicraft or

DIY (do-it-yourself). It is exhausting for technology educators who have to continuously communicate the principles of industrial arts to the public.

3. Teachers struggle with huge class sizes and limited teaching resources.

Instruction in industrial arts is largely defined by activities. However, most industrial arts teachers are confronted by huge class sizes (in the 1994 school year, junior high classes had 43 students and senior high had 46 on average) and limited teaching resources--laboratories, equipment, supplies, teaching materials, etc (Lee, 1990, 1994).

We Hope Living Technology Will Not Be "A Change in Form but Not in Content"

As noted in Table 1, for the new LT, present total number of classroom hours in IA will be cut in half. In addition, a comparison of the content domain of IA and that of LT indicates that LT will lead to a change in content domain.

Table 2.

A Comparison of the Content Domain of IA and that of LT.

	Content Domain	
Level	Industrial Arts (IA)	Living Technology (LT)
Junior High	1. Introduction to industrial arts	1. Technology and life
	2. Blueprint reading and planning	2. Information and communication
	3. Ceramics	3. Construction and manufacturing
	4. Woodworking	4. Energy and transportation
	5. Plastics	
	6. Metalworking	
	7. Electricity	
	8. Graphics Communication	
	9. Construction and Life	
	10. Manufacturing industry	
	11. Information industry	
	12. Audio-visual communication	
	13. Energy and power	
Senior High	1. Project planning and drafting	1. Technology and life
	2. Industrial materials	2. Information and communication
	3. Power and energy	3. Construction and manufacturing
	4. Information industry	4. Energy and transportation
	5. Automation	

According to the information summarized in Tables 1 and 2, a comparison made between the present industrial arts (IA) and the new living technology (LT) at least indicates changes are based on the following rationale: (1) In order to emphasize the study of technology to equip youth with living skills needed in a technological society, IA has undergone a name change to LT. (2) In order to reflect the value of gender-equity education, all male and female students will be required to take LT. (3) In order to organize the complicated content domain of IA, the content domain of LT is more systematic (Lee, 1995).

Obviously, moving from current IA curriculum standards to the new LT curriculum standards, there are constitutive changes--a name change, a reduction in classroom hours, etc. Thus, many school teachers doubt how the new curriculum standard can be effectively implemented in their school laboratories. In order to help school teachers implement the new LT curriculum standards in a timely and appropriate manner, the contextual factors are being considered. In addition, it is necessary to develop some exemplar technology learning activities (TLA's) to assist them in developing their school-based course of study. Funded by the MOE and the Education Department of the Taiwan Provincial Government, a project team--composed of 21 school teachers, two assistant researchers, one project co-director, and one director--was organized to develop a set of exemplar TLA's. Based upon the principle "for the teacher and by the teacher," 24 junior-high and 9 senior-high examplar TLA's were completed in that project. Hopefully, coupled with other routine support such as teacher training and textbook compilation, these exemplar TLA's will meet school teachers' needs.

"We Should See Farther than They Did Because We Stand on Their Shoulders"

Each generation works with more knowledge than its predecessors did so as to build on their knowledge. Because we want the present and the future to be better than the past, we need to appreciate and build upon the contributions made by those who came before us (Tanner & Tanner, 1990).

Since technology education in Taiwan is shifting from IA to LT, more and more technology educators in Taiwan realize that their primary mission at this time is to prepare to pragmatically implement the new LT curricula by developing a school-based course of study, modifying IA laboratories, selecting instructional materials, etc. We hope that the new LT, built on the traditional IA, will better serve our students who need to be technologically literate in today's technological society as well as in the future.

References

DuPont Taiwan. (1996, April 22). DuPont Growing with Taiwan. The China Post, 8.

Lee, L. S. (1990). A perspective of technology education in Taiwan, Republic of China. Journal of Technology Education, 2(1), 18-27.

Lee, L. S. (1994). Technology education and related international exchange programs in Taiwan, Republic of China. Paper presented at the International Technology Education Association (ITEA) 56th Annual Conference, Kansas City, Missouri, March 20-23. (ERIC Document Reproduction Service No. ED 366 797)

Lee, L. S. (1995). From industrial arts to living technology: Senior-high-school technology education curriculum transition in Taiwan, R.O.C. Paper presented at the International Conference on Technology Education in School (ICTES) around Asian Countries, Otsu, Japan, September 27-30. (ERIC Document Reproduction Service No. ED 383 900)

Tanner, D., & Tanner, L. (1990). History of the school curriculum. New York: Macmillan.

Author Note

Dr. Lung-Sheng Steven Lee（李隆盛博士）, a professor and the Department Chair of the Department of Industrial Technology Education at National Taiwan Normal University （ NTNU ）, and the Executive Director of the Chinese Industrial Arts Education Association (CIAEA), Taiwan.

I thank Dr. Hidetoshi Miyakawa（宮川秀俊博士） at Aichi University of Education for assisting us--my colleague Dr. Kuang-Chao Yu（游光昭博士）, my wife Dr. Chun-Chin Lai （賴春金博士） and myself--in arranging an eight-day (September 7-14, 1996) visitation tour in order to explore technology education in Japan, and for inviting me to make this presentation during this tour.

Correspondence concerning this paper should be addressed to Lung-Sheng Lee, Department of Industrial Technology Education, National Taiwan Normal University, 162 Hoping E. Rd., Sec. 1, Taipei 106, Taiwan, R.O.C. Electronic mail may be sent via the Internet to t83006@cc.ntnu.edu.tw.

Footnotes

[1]In Taiwan, senior vocational schools, junior colleges, and institutes of technology primarily constitute the technological and vocational education (TVE) institutions.

[2]Each school year in Taiwan lasts from August 1 to July 31 of the next calendar year. For example, the school year of 1994 lasted from August 1, 1994 to July 31, 1995.

[3]The other two domains are Appreciation and Observation, and Inquiry and Discussion.

[4]The other two domains are Performance and Estheticism.

[5]In addition to the required subject, three elective courses pertaining to industrial arts--drafting, metalworking, and electronics--are prescribed in the present junior-high-school curriculum standard.

[6] Some elective courses classified as industrial arts--drafting, metalworking, woodworking, electricity, ceramics, etc.--are prescribed in the present senior-high-school curriculum standard.

[7]Additionally, drafting, energy and power, and industrial materials are prescribed as elective courses in the new senior-high-school curriculum standard.